

Work Order ID 83701

83701

Page 1

May-30-12 7:42:55 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
D350-748-241	F

100	DOCUMENT CONTROL	0.00							
100									
DC	Memo	0.00							
Document Control	Photocopy bluefile & type labels per PPPD350-748-201		CHG002						

1 ~~12-5-9~~ 12/06/25

110	BENDING MACHINE - CROSSTUBES	0.00							
110									
CNC Bend 2	Memo	0.00							
CNC Alpha 160 Bender	Bend tube as per Dwg D350-748-241 using CNC bender program D350A and Folio FT _____								

JW / 12-5-9

120	QC15- Crosstube Dimensional Check	0.00							
120									
QC	Memo	0.00							
Quality Control									

12-5-9

Pluch. issue P/O to metean P/O 16942 C2 12/06/04

Work Order ID 83701

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April-23-12 4:01:17 PM

Item ID: D350-748-201

Accept

N9000040100

Setup Start

NS1

Revision ID:

Stop

NS2

Item Name: Crosstube Installation, High Aft

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Run Start

NR1

Approvals: Process Plan:

Date:

Tooling:

Date:

Stop

NR2

QC:

Date:

SPC (Y/N):

Date:

Sequence ID/
Work Center ID

Operation
Description

Set Up/
Run Hours

Tool ID

Tool #

Plan
Code

Accept
Qty

Reject
Qty

Reject
Number

Insp.
Stamp

125

0.00

125

HandFXtube

Hand Finishing Crosstubes

Memo

Stress relief

Heat treat crosstube as per QSI010 4.3

Temp: _____

Start time: _____

Finish time: _____

0.00

127

QC5- Inspect part completeness to step on W/O

0.00

127

QC

Quality Control

Memo

0.00

12.05.10

12.05.11

CP
CP

FORMS

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 83701***83701***

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April-23-12 4:01:17 PM

Item ID: D350-748-201

Accept

N9000040100Setup Start ***NS1***

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop ***NS2***

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start ***NR1***

QC:

Date:

SPC (Y/N):

Date:

Stop ***NR2***Sequence ID/
Work Center IDOperation
DescriptionSet Up/
Run Hours

Tool ID

Tool #

Plan
CodeAccept
QtyReject
QtyReject
NumberInsp.
Stamp

130

0.00

130

Crosstubes

0.00

Crosstubes

Memo

1-Drill Tube as per Dwg D350-748-241 Using DT8876 Drill Jigs,
Set-up drill table as per QSI 010

2-Deburr

3-Engrave Part # and Batch # as per Dwg D350-748-241

4-Remove all marks from tube within limits of D350-748-241

5- Apply a light coat of LPS3 on the interior of tube

Batch: _____

140

0.00

140

QC6- Inspect dimensions to drawing

0.00

QC

Memo

Quality Control

8/21/13

MO/RM

12-5-16

12-5-16

H-1100H

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A,	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 83701

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May-30-12 7:42:55 AM

Item ID: D350-748-201 Accept *N900040100* Setup Start *NS1*
 Revision ID: Stop *NS2*
 Item Name: Crosstube Installation, High Aft
 Start Date: 4/23/12 Start Qty: 1.00 *1* Cust Item ID:
 Required Date: 5/07/12 Req'd Qty: 1.00 *1* Customer:
 Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____ Run Start *NR1*
 QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
150	Outsource process-Cadplate per QSI017 4.1.9.1	0.00							
150									
Outsource3	Memo	0.00							
Outsource process - Cad plate	Issue P/O: 17084 Stress relief at 375° for 5 hours Magnetic Particle Inspect per ASTM E1444 Cadium Plate per AMS-QQ-P-416B, Class 1, Type 2 Embrittle relief at 375° for 8 hours, Chromate Treat Possible Supplier: Southwest United Industries Ensure Certificate of Conformity is attached								CL 12/06/04 (1)
160	Receive & Inspect for Damage & Mat'l Certs	0.00							
160									
Packaging	Memo	0.00							
Packaging	Ensure certificate of conformity is attached								
170	QC5- Inspect part completeness to step on W/O	0.00							
170									
QC	Memo	0.00							
Quality Control									

★ SEE W/D CAG ATTACHED

[Handwritten signatures and initials]

NDT

need

P/O: 17258

CL 12/06/19 x1

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11.10.13	161	LOAD TUBE TO 3000 ^{lb} FOR 1 MINUTE REF D.S. EMAIL		CP 12/6/19	1	P 12/6/19	
11.10.13	162	NDT TUBE					

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Chris Provencal

From: David Shepherd <dshepherd@dartaero.com>
Sent: Tuesday, April 27, 2010 3:40 PM
To: 'Mike Petsche'
Cc: 'Bill Beckett'; 'L Lacelle'; 'Chris Provencal'; 'Dan Stow'; ssheldon@dartaero.com
Subject: 350 crosstubes

Mike,

I discussed the 350 crosstube load testing with Bill a little while ago and this plan makes sense to him.

So, my recommendation to clear these crosstubes is to load the fwd crosstubes to 3500 lb and the aft crosstubes to 3000 lb in the deflection test rig and document on the work orders that this test has been completed. Hold max load for 1 minute. Per TP-D350-748-2, these loads represent the maximum load on these crosstubes at gross weight and are below the yield point of the material. I would like to request that Chris Provencal witness these tests and sign off the work orders based on his experience with Dart landing gears. My feeling is that if there is a problem with the parts, it will manifest itself during this load test. I, for one, would feel a lot more confident in testing each crosstube in this manner than relying totally on what Exova has to say. I think it would be very difficult to reach a conclusion on the whole batch on the basis of cracks in two parts from the batch.

I believe that we can accomplish this before next Friday, which also gives us time to hear what Exova has to say in case it has an impact on our decision. So far, what I have seen from Exova shows me that there are fluctuations in the heat treating but the tubes are heat treated to our specification.

For this reason, I believe we should tell DHS that it looks like we will be able to start shipping 350 crosstubes by May 7th pending a successful Engineering test of the material.

David.

Work Order ID 83701

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April-23-12 4:01:17 PM

Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

Revision ID:

Item Name: Crosstube Installation, High Aft

Stop *NS2*

Start Date: 23/04/2012 Start Qty: 1.00

1

Cust Item ID:

Required Date: 07/05/2012 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start *NR1*

QC:

Date:

SPC (Y/N):

Date:

Stop *NR2*

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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180

0.00

180

SprayPaint

Spray Painting

Spray Paint
QC 12.05.23

Memo

0.00

1-Prime inside crosstube as per QSI 005 4.2
2-Paint Outside of Tube as per Dart QSI 005 4.2

*- B121746 start: 12:30
Finish: 1:15
start: 5:15
Finish: 5:45*

AS 12-6-21

190

0.00

190

QC

Quality Control

Inspect
QC 12.05.23

QC14- Inspect Spray Paint

Memo

0.00

Then, Wrap in plastic bag to protect from scratches

W 12.06.24

200

0.00

200

Crosstubes

Crosstubes

Install insert & abrasion strip
QC 12.05.23

Crosstubes

Memo

0.00

1-Install Ground wire Insert, then insert screw and washer
2-Install Abrasion strips as per Dwg D350-748-241 & QSI 035.
3-Install supports Using Dt8876 as per Dwg D350-748-241, Torque to 60-80 IN-LBS

AS 12-5-16

W 12.06.24

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Work Order ID 83701

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May-30-12 7:42:55 AM

Item ID: D350-748-201

Accept

N900040100

Setup Start *NS1*

Revision ID:

Stop *NS2*

Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12 Start Qty: 1.00 *1*

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00 *1*

Customer:

Reference:

Run Start *NR1*

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Stop *NR2*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
210	QC5- Inspect part completeness to step on W/O	0.00							
210									
QC	Memo	0.00							
Quality Control									
220	Pick Kit	0.00							
220									
Packaging	Memo	0.00							
Packaging									
230	QC4- 100% Inspect kits for completeness	0.00							
230									
QC	Memo	0.00							
Quality Control									

① B 12.06.25

12.06.25

1 12.06.25

Work Order ID 83701***83701***

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May-30-12 7:42:55 AM

Item ID: D350-748-201

Accept

N900040100Setup Start ***NS1***

Revision ID:

Stop ***NS2***

Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12 Start Qty: 1.00

1

Cust Item ID:

Required Date: 5/07/12 Req'd Qty: 1.00

1

Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

240

0.00

240

Packaging

Packaging

Memo

0.00

Packaging

Identify and pack for shipping as per PPPD350-748-201

Location: B

PPP Rev: _____

250

0.00

250

QC21- Final Inspection - Work Order Release

QC

Memo

0.00

Quality Control

MWS 12/06/26
MWS 12/06/25

Picklist Print

May-30-12 7:42:54 AM

Page 1

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev: A New Issue 06-07-05 JLM
 IPP Rev: B Update qty of MS21042L5 06-09-12 KJ
 IPP Rev C Combined manufacturing 08.04.02 EC verified by: DD
 IPP Rev:D 08-06-24 revD as per dwg DD verified by:EC
 IPP Rev: E 08.12.11 Step17 was step 21 KJ Verified by:EC IPP Rev:F 10.08.04 added QSI010
 4.3 DD verf:EC IPP REV:G ADD UNDER BEND COMMENT 12-05-28 JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
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ALS4-1032-225		Purchased	No	XXXXXXXXXX		200	Each	819.0000	1	1		XXXXXX	
---------------	--	-----------	----	-----------------------	--	-----	------	----------	---	---	--	-------------------	--

Insert

Location	Loc Qty	Loc Code
ST281	796	
108696	146	
110768	62	
118386	55	
118966	68	
121269	465	
ST282	23	
120410	10	
120451	13	

118520

W/ 12 06 24

AN4-41A

Bolt

Purchased

No

220

Each

539.0000

8

12/12/12

Location	Loc Qty	Loc Code
360	181	
121185	181	
ST360	358	
115108	3	
115705	7	
118451	29	
118838	50	
119328	100	
120423	150	
121205	15	
121573	4	

8

Picklist Print

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Page 2

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

AN4-6A Purchased No 220 Each 1,514.0000 16 16

Bolt

Location	Loc Qty	Loc Code
355	222	
121631	222	
ST356	1292	
119017	792	
121243	500	

AN5-32A Purchased No 220 Each 245.0000 4 4

Bolt

Location	Loc Qty	Loc Code
ST339	145	
119862	50	
120423	75	
120910	20	
ST340	100	
121541	100	

AN960JD10 Washer Purchased No 200 Each 0.0000 1 1

NAS1149D0363J

121524

AN960JD416 Washer Purchased No 220 Each 30.0000 32 32

NAS1149D0463J

121219125

Location	Loc Qty	Loc Code
ST351	30	
116289	10	
119097	20	

AN960JD516 Washer Purchased No 220 Each 0.0000 8 8

NAS1149D0563J

12119546

Picklist Print

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Page 3

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D2856-400
Abrasion Strip
1- cut as per dwg D2856

Manufactured No

200 f 242.5445 1.181 1.2431579

12 26 24

Location	Loc Qty	Loc Code
ST403	216	
81875	216	
ST409	26.5445	
63735	0.6696	
68076	0.3149	
71164	8.46	
79551	17.1	

D3500-1
Saddle

Manufactured No

220 Each 75.0000 4 4

1

Location	Loc Qty	Loc Code
ST423	14	
78595	14	
ST424	31	
73405	20	
73406	8	
76000	3	
ST425	30	
76940	30	

D3501-1
Bushing

Manufactured No

220 Each 367.0000 16 16

385414

Location	Loc Qty	Loc Code
ST051	367	
67757	4	
73391	6	
74866	207	
77033	61	
81955	26	
83253	63	

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Shop Packet Print

Page 3

Picklist Print

Page 4

May-30-12 7:42:54 AM

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

D3502-1
Support

Manufactured No

200 Each 21.0000

2

2

Handwritten: 12-5-24

Location

Loc Qty

Loc Code

ST051

21

11

10

Handwritten: 77041

Handwritten: 73419
74478

Handwritten: 11
11

D350-748-241TRN
Crosstube Turning Detail

Manufactured No

110 Each 2.0000

1

1

Location

Loc Qty

Loc Code

LG

2

61314

0

61315

0

79395

1

83287

1

Handwritten: TW

Handwritten: 12-5-9

MS21042L4
Nut

Purchased No

220 Each 4,059.0000

24

24

Location

Loc Qty

Loc Code

ST300

4059

119075

125

121011

677

121444

2957

121652

300

Handwritten: 24

MS21042L5
Nut

Purchased No

220 Each 1,447.0000

4

4

Handwritten: 12-6-24

Location

Loc Qty

Loc Code

300

500

121652

500

ST300

947

108827

8

116105

5

116548

43

117611

18

119109

865

17651

8

Handwritten: 4

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Shop Packet Print

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Picklist Print

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Page 5

Work Order ID: 83701

Parent Item: D350-748-201

Parent Item Name: Crosstube Installation, High Aft

Start Date: 4/23/12

Required Date: 5/07/12

Start Qty: 1.00

Required Qty: 1.00

MS21920-20
Clamp (per MIL-DTL-8783C)

Purchased No

200 Each 86.0000 2

2 W 12-24

Location

Loc Qty

Loc Code

LG050

86

121274

116799

8

120676

8

121067

20

121274

50

7

MS27039-1-10

Purchased No

200 Each 126.0000 1

1 W 12 06 24

Screw

Location

Loc Qty

Loc Code

GA

100

122027

120449

100

ST291

26

120120

26

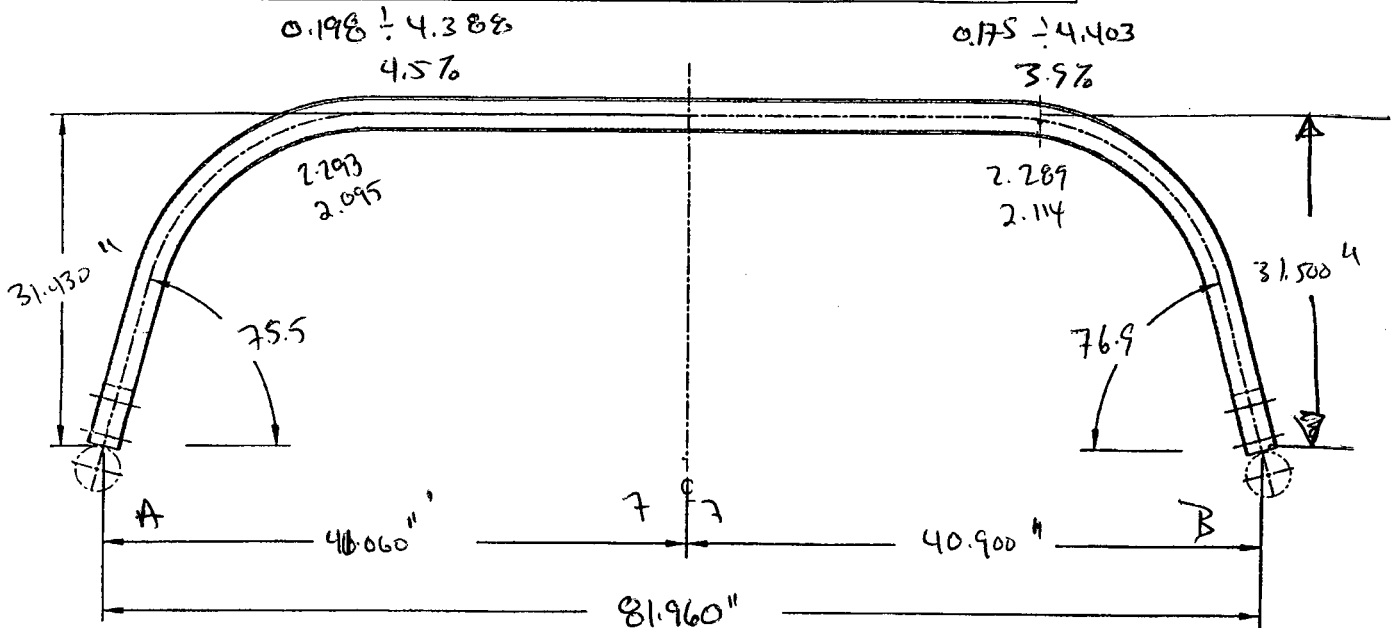
May-30-12 7:42:55 AM

Shop Packet Print

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DART AEROSPACE LTD		Work Order:	83701
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241	Rev: <i>EF</i>	Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Side A = 4.5% crush @ 7 Passes
Side B = 3.9% crush @ 7 Passes
Twist = 0.194
Tube is kinked

QC15 Inspection	<i>S</i>
Date	<i>10/25/14</i>

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	<i>[Signature]</i>

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

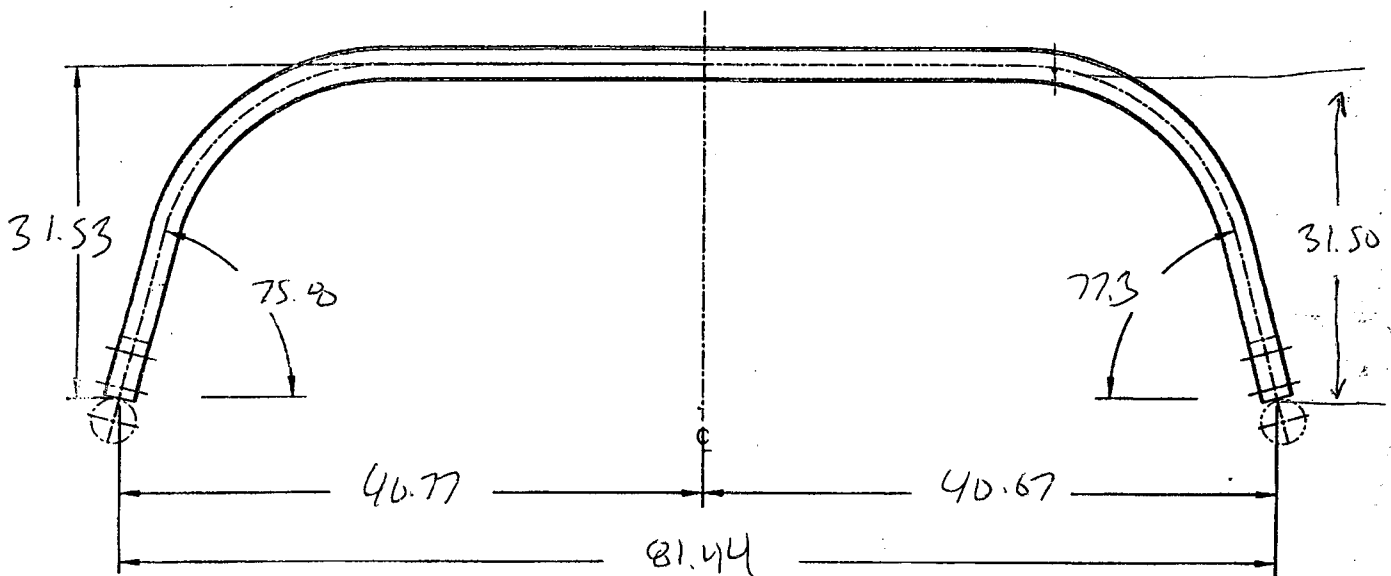
Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD		Work Order:	3/N 83701
Description: Crosstube High Aft (AS350/355)		Part Number:	D350-748-201
Inspection Dwg: D350-748-241 Rev: E		Page 1 of 1	

Required Dimension	Min	Max
Height	31.22	31.48
1/2 Span	40.77	41.03
Angle	75	77
Total Span	81.54	82.06



Comments
Twist = 0.060
Bent high & narrow - Acceptable CP 12.05.16 Q51042

QC15 Inspection	
Date	CP 12.05.16

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	10.08.23	Dwg Rev updated	KJ	

641' ←

841' ←

841' ←

741' ←

111' ←

115' ← SIDE B

112' ←

112' ← SIDE A

W/O - 83701

0350-248-201

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6015-125	CROSSTUBE (OR D6018-125)
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6015-125 OR D6018-125
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF
PER DART QSI 044 6.4 (VIBRATING STYLUS)
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING
LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER
BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO
BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING. ACCEPTABLE TO
VERIFY TENSILE STRENGTH BY HARDNESS TEST PER ASTM E18 TO 40-45 HRC.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE,
CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE
OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES,
NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY.
CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE
MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO
CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT
NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.
- 15) MAX TWIST AFTER BENDING: WITH XTUBE LAYED FLAT ON SURFACE, THE DIFFERENCE BETWEEN
CUFF HEIGHTS FROM THE SURFACE MAY BE NO LARGER THAN 0.25 (ZN C1-3).

83701 MLC
12/04/24

RELEASED
2011-07-08

F	ADD HRC TEST OPTION (B8-1) PER PAR 08-040, ADD TWIST LIMIT (A8-1, C1-3), ADD D6015-125 OPTION (C8-1), STOCK DIM NOW MACHINED (D7-4)	CP	10.11.23
E	REVISE GENERAL NOTES: UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3).	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	90	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
DRAWN	90		
CHECKED	15	DRAWING NO.	REV. F
MFG. APPR.	15	D350-748-241	SHEET 1 OF 4
APPROVED	15	TITLE	SCALE
DE APPR.	15	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	10.11.23	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE, OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

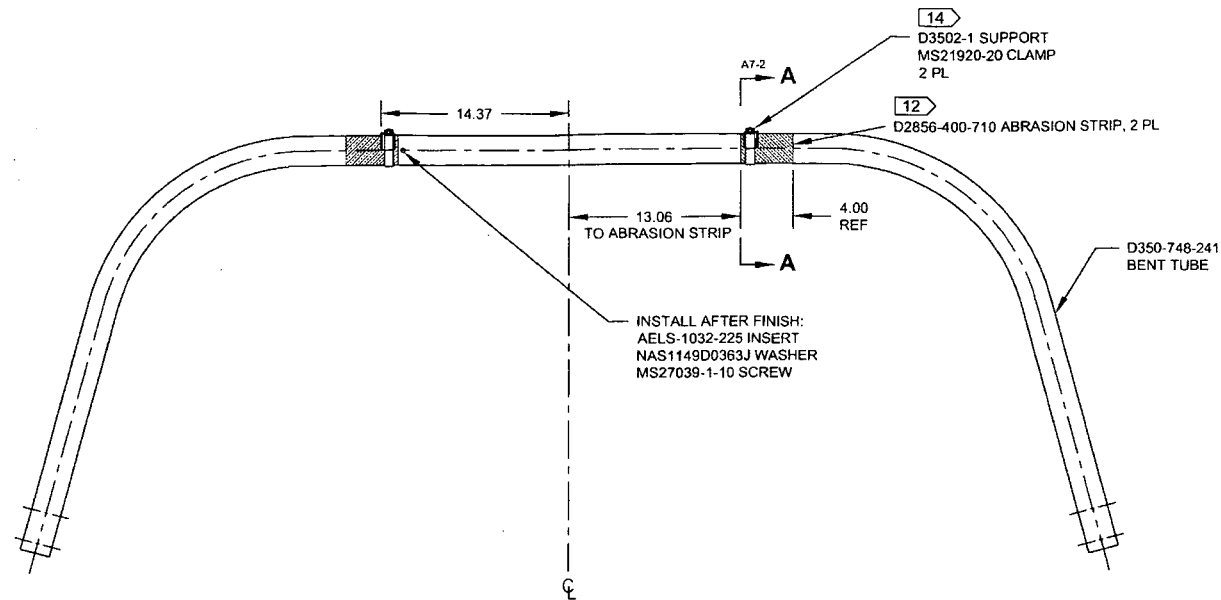
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

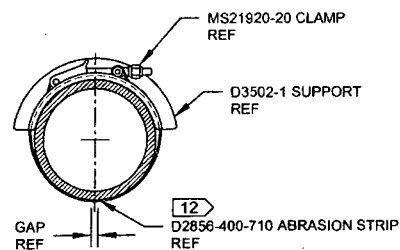
NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

83701



**D350-748-241
ASSEMBLY DETAIL**



SECTION A-A D4-2
SCALE 4X

RELEASED

DESIGN	97	DART AEROSPACE LTD	
DRAWN	97	HAWKESBURY, ONTARIO, CANADA	
CHECKED	13	DRAWING NO.	REV. F
MFG. APPR.	13	D350-748-241	SHEET 2 OF 4
APPROVED	14	TITLE	SCALE
DE APPR.	14	CROSSTUBE (AS 350/355 HI AFT)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

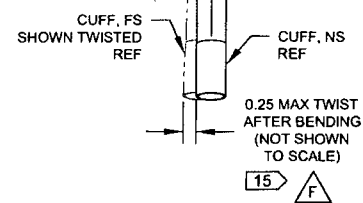
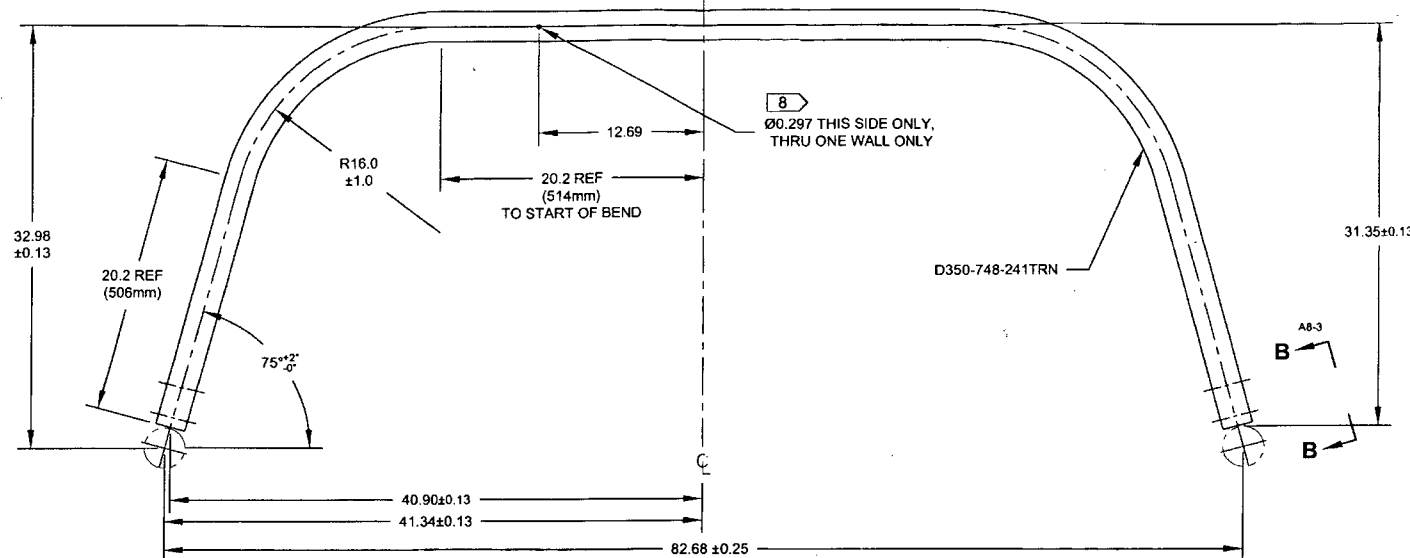
Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

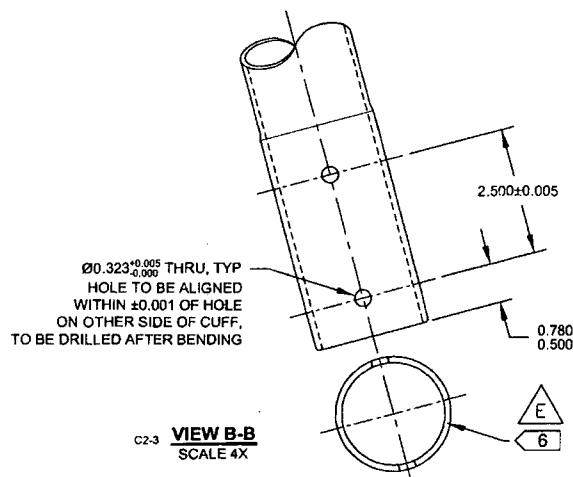
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

8 7 6 5 4 3 2 1



D350-748-241
BENDING AND DRILLING DETAIL 10



RELEASED
2011-01-18

DESIGN	GP	DART AEROSPACE LTD	
DRAWN	GP	HAWKESBURY, ONTARIO, CANADA	
CHECKED	GP	DRAWING NO.	REV. F
MFG. APPR.	GP	D350-748-241	SHEET 3 OF 4
APPROVED	GP	TITLE	SCALE
DE APPR.	GP	CROSSTUBE (AS 350/355 HI AFT)	NTS
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8 7 6 5 4 3 2 1

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

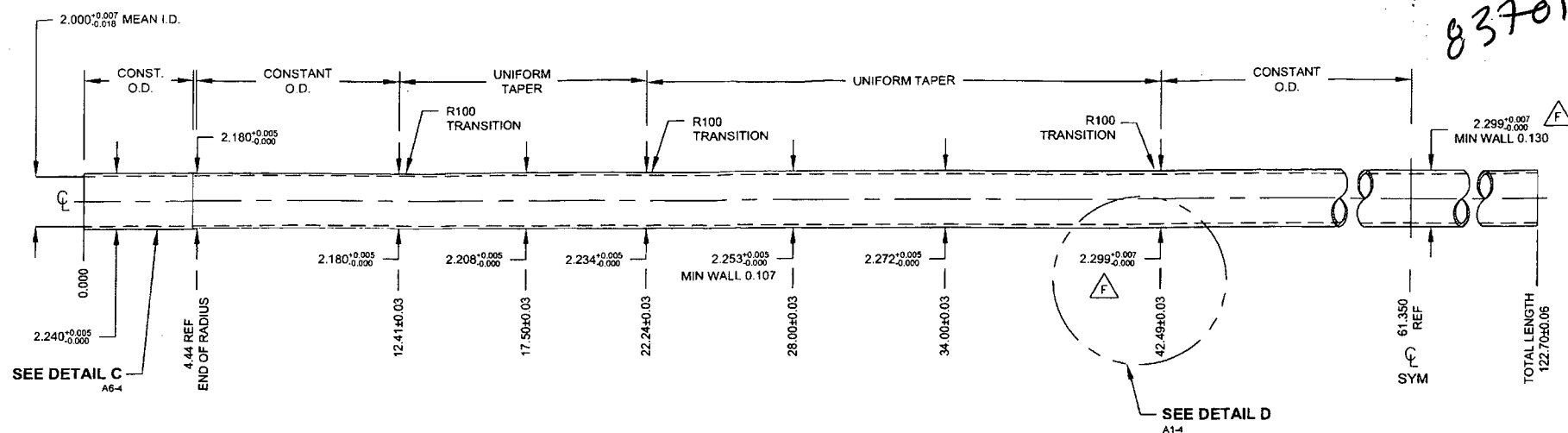
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Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

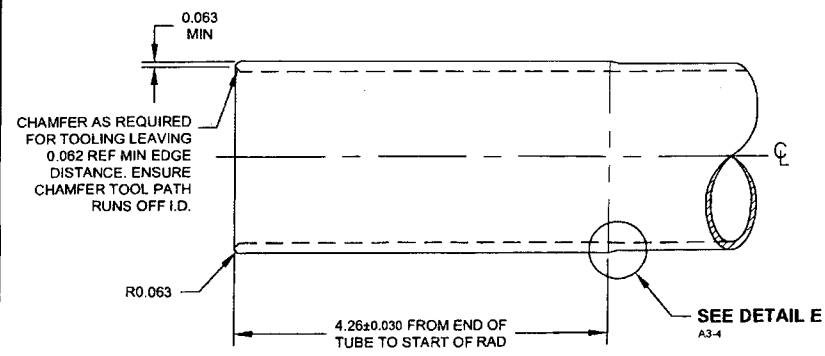
NOTE: Date & initial all entries

83701

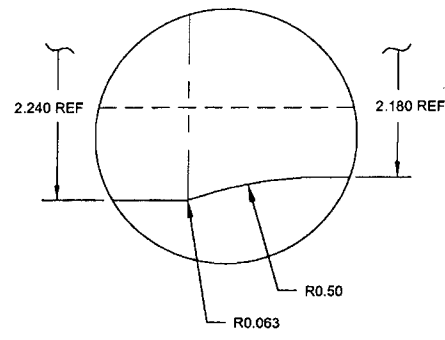


**D350-748-241TRN
TURNING DETAIL**

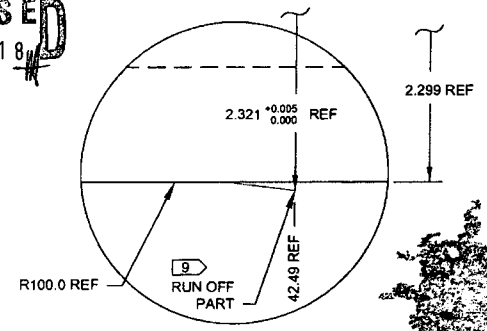
RELEASED
2011-01-18



**DETAIL C:
CROSSTUBE CUFF** C8-4
SCALE 3X



**DETAIL E:
CUFF TRANSITION** A5-4
NOT TO SCALE



**DETAIL D:
TAPER RUN-OFF** C3-4
NOT TO SCALE

DESIGN	90	DART AEROSPACE LTD	
DRAWN	90	HAWKESBURY, ONTARIO, CANADA	
CHECKED	90	DRAWING NO.	REV. F
MFG. APPR.	90	D350-748-241	SHEET 4 OF 4
APPROVED	90	TITLE	SCALE
DE APPR.	90	CROSSTUBE (AS 350/355 HI AFT)	NTS
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W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

METCOR INC.
560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
 Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé
 Detailed Certificate of Compliance

BON DE TRAVAIL order	CHARGEMENT load
175881	1

CLIENT / customer 215

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
 1270 ABERDEEN
 HAWKESBURY

ON K6A 1K7

COMMANDE DU CLIENT customer po	BON DE LIVRAISON DU CLIENT customer shipper no.	MATÉRIEL material	CODE DE TRAITEMENT mat'l heat code	NUMÉRO DE LOT lot number
16942		Steel		

SPÉCIFICATIONS DU PROCÉDÉ
 processing specifications

STRESS REL

SAE AMS 2759/1 REV.E

EXIGENCE / requirement SPÉCIFICATIONS / specified TESTS EXÉCUTÉS / performed RÉSULTATS DE TESTS / results

Visual

QUANTITÉ quantity	POIDS weight	DESCRIPTION DES PIÈCES parts description
7	210	D350-748-101 (1) CROSSTUBE (1) D350-748-101 CROSSTUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE (1) D350-748-201 CROSS TUBE CONTENANT: 1 PALETTE

Operation	Temp. spécifiée Specified Temp	Temps de trempage Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
1,00 CONT. INIT.	LAVAGE		si nécessaire							

METCOR INC.
560 BOUL. ARTHUR-SAUVÉ
ST-EUSTACHE, QC, J7R 5A8
Tel: 450-473-1884 / Fax: 450-491-5498

Certificat de Conformité Détaillé
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DART AEROSPACE
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ON K6A 1K7

LIVRÉ À / shipped to:

DART AEROSPACE
1270 ABERDEEN
HAWKESBURY

ON K6A 1K7

Operation	Temp. spécifiée Specified Temp	Temps de trempage Spécifié Specified Soak Temp	Atmosphère	Carbone Carbon Potential	Q-Media Q-Temp	Four # Furnace #	Date Départ Start Date	Heure d'entrée Time In	Heure de sortie Time Out	Date Complétée Date complete
2,00 PREPARINC	COMPTAGE									
3,00 STRESS RE	650	2 hrs 30 minutes	air			701				
4,00 FINAL INSP							05-11-2012			05-11-2012

COMMENTAIRES / comments

ALL THE HEAT TREATMENT PROCESSING PERFORMED ON THIS ORDER WAS ACCOMPLISHED USING HEAT TREATMENT EQUIPEMENT THAT MEETS THE REQUIREMENTS OF AMS 2759. ALL THE HEAT TREATMENT OPERATIONS WERE ACCOMPLISHED IN ACCORDANCE WITH THE REQUESTED/REQUIRED HEAT TREATMENT SPECIFICATION AND ALL REQUIRED VERIFICATIONS TEST HAVE BEEN PERFORMED AND DOCUMENTED. NO UNAUTHORIZED CHANGES OR DEVIATIONS TO REQUIRED HEAT TREATMENT SPECIFICATIONS OR PROCEDURES HAVE BEEN PERFORMED.

APPROUVÉ par / Approved by:



DATE: 2012-05-11

/ Nous certifions que toute l'information comprise sur ce rapport est exacte et conforme aux requis du client. / We certify that all the information on this report is exact and in accordance with the order requirements.

**CERTIFICATE OF
CONFORMANCE**

CADORATH PLATING CO. LTD.
2150 LOGAN AVENUE
WINNIPEG, MANITOBA R2J-0J1

DATE: Jun-12-2012

CONSIGNEE TO: Dart Aerospace Ltd.
1270 Aberdeen St.
Hawksbury, ON K6A 1K7

W/O #: 114964
INVOICE #: 60875

**CONTRACT OR
PURCHASE ORDER #** PO17084

DESCRIPTION: CROSSTUBE

QTY 1

P/N # D350-748-201

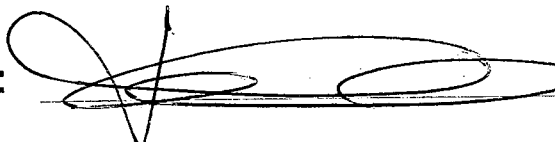

S/N # 83701

STRESS RELIEVE HEAT CHART # 12-546. MPI-IAW ASTM-E-1444.
CADMIUM PLATE IAW AMS-QQP-416C TYPE 2 YELLOW CLASS.
BAKE HEAT CHART # 12-573. MPI IAW ASTM-E1444.

8/17/04/12

CERTIFICATE: I certify that the items indicated here on have been inspected and tested and conform to all specifications and requirements detailed on the contract or purchase order.

Approved Inspector:



LIQUID PENETRANT TEST REPORT

P- 12188

PAGE 1 OF 1

CLIENT
ATTENTION:
ADDRESS

Dart Aerospace
MATT/LINDA
1270 ABERDEEN ST.
HAWKESBURY, ON

DATE

June 19/2012 TIME AM ☒ PM ☐

ACUREN JOB NO.

190-12-0265

PO/VO No.

17084

WORK LOCATION

SAVE

ACCEPTANCE STD.

ASTM 1417/BS 1038 REV./DATE 2005

OBJECT

F.P.I. on cross tubes
(6) Pcs SEE RESULTS

ITEM(S) EXAMINED

JOB DESCRIPTION

PROCEDURE No. LT002 REV./DATE 2008

TECHNIQUE No. LT002 REV./DATE 2008

PART NO.

SCOPE

TEST DETAILS

METHOD

FAMILY BRAND

PENETRANT

PENETRANT REMOVER

DEVELOPER

DEVELOPER TYPE

TEST SURFACE

SURFACE CONDITION

SURFACE TEMPERATURE

RESULTS-

(☒ METRIC ☐ IMPERIAL)

☒ FLUORESCENT

☐ VISIBLE

MAGNAFLUX

2407

MINIMUM DWELL TIME 45 MIN.

MINIMUM DRY TIME >10 MIN.

MINIMUM DWELL TIME 10 MIN.

SKD 52

NON AQUEOUS

☐ AQUEOUS

☐ DRY

☒ WATER WASH

☐ SOLVENT REMOVABLE

☐ POST EMULSIFIED

BLACK LIGHT S/N 16459 OUTPUT > 1000 μ W/cm²

LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT

OTHER LAB. NO.

LIGHT METER S/N 1098866

CAL DUE DATE

July 20-2012

☒ MACHINED

☒ 10°C/50°F TO 52°C/125°F

☒ CLEAN BARE METAL

☐ > 52°C/125°F

W.O.#s - CROSS TUBES.

1	-	"	"	83701	✓
1	-	"	"	83699	✓
1	-	"	"	83698	✓
1	-	"	"	81517	✓
1	-	"	"	81518	✓
1	-	"	"	84380	✓

M/12.06.19

Scope of Services

Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is not intended that the descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended to constitute any representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions. No other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care

In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE

Matthew Murdoch

PRINT

SIGNATURE

TECHNICIAN (SIGNATURE):

Mike Lattin

1st TECHNICIAN

2nd TECHNICIAN

NAME (PRINT):

CGSB LEVEL

SNT LEVEL

CGSB REG. No.

60606

CGSB LEVEL

SNT LEVEL

CGSB REG. No.

DTR # E 63501

REPORT

REVIEWED BY:

NAME

INIT

CLIENT COPY

CANARY - OFFICE COPY

PINK - TECHNICIAN COPY

GOLD - OFFICE COPY